

# Algebra 2

## Unit 4: WS #2

### Exponents and Monomials

- **Concept:** Applying properties of exponents

**Remember:** The following properties of exponents are used to simplify an expression. For these statements,  $r$  and  $s$  are real numbers and  $m$  and  $n$  are positive integers.

$$r^m \cdot r^n = r^{m+n}, \quad \frac{r^m}{r^n} = r^{m-n} (r \neq 0, m > n)$$

$$(r^m)^n = r^{mn}, \quad (rs)^m = r^m s^m$$

$$\left(\frac{r}{s}\right)^m = \frac{r^m}{s^m} \quad (s \neq 0)$$

**Example:** Simplify:  $-4x^3 (10x^2y)^2$

$$-4x^3 (10x^2y)^2$$

$$-4x^3 \cdot 10^2 \cdot x^{2 \cdot 2} \cdot y^2$$

$$-4x^3 \cdot 100 \cdot x^4 \cdot y^2$$

$$-4 \cdot 100 \cdot x^3 \cdot x^4 \cdot y^2$$

$$-400x^7y^2$$

Remove parentheses.

Simplify each part.

Group numerical coefficients and variables with the same base together.

Multiply.

Simplify.

1.  $(-6x)^2$  \_\_\_\_\_

2.  $\frac{r^{10}}{r^7}$  \_\_\_\_\_

3.  $\frac{a^3b^2}{a^2b}$  \_\_\_\_\_

4.  $-(3y)^2$  \_\_\_\_\_

5.  $4x(2a)^2$  \_\_\_\_\_

6.  $\left(\frac{3m^2n}{6m}\right)^2$  \_\_\_\_\_

- **Concept:** Defining monomials and the degree of a monomial

**Remember:** A **monomial** is a real number, a variable, or a product of a real number and one or more variables. The **coefficient** of a monomial is the real number factor. The **degree of a monomial** is the sum of the exponents of its variables. The degree of a nonzero real number is 0. The zero monomial has no degree.

**Example:** Which are monomials? If the expression is a monomial give its coefficient and degree.

a.  $x^2yz^4$     b.  $\sqrt{x^3y}$

a.  $x^2yz^4$  is a monomial. Its coefficient is 1; its degree is 7.

b.  $\sqrt{x^3y}$  is not a monomial since it has variables under a radical sign.

Give the coefficient and degree for each expression if it is a monomial.

7.  $\frac{1}{3}x^2y$  \_\_\_\_\_

8.  $\sqrt{2}$  \_\_\_\_\_

9.  $\frac{4}{x^2}$  \_\_\_\_\_